Duplicator for Recording Medium and Method for Duplicating Recording Medium

Field of the Invention

The present invention relates to a duplicator for recording medium and a method for duplicating recording medium, more particularly to a duplicator for recording medium and a method for duplicating recording medium, wherein a fast duplicating effect is achieved by FIFO buffers and direct memory access controllers (DMACs).

Description of the Related Art

Conventionally, in a duplicator for recording medium, for example as described in USP 6,131,141, a control signal generator is used to decide on/off of a data bus switch and a control signal switch to control the flow of source data. That is to say, when the control signal generator determines that a duplication of data can be proceeded, a signal is sent to turn on the data bus switch and the control signal switch, and data output from a source data terminal (hardware) are transmitted to each duplicator to complete a duplicating procedure.

However, in the prior art mentioned above, the duplication of second data starts after the duplication of first data is completed. The duplication of third data starts after the duplication of second data is completed, and so on. Therefore, there is a propagation delay in duplicating data. When large volume of data are to be duplicated, it is time-consuming.

Summary of the Invention

In view of the problems mentioned above, the present invention

utilizes FIFO buffers and DMACs to overcome the problem of time-consuming in duplicating data.

When a FIFO buffer is used to store data, if the FIFO buffer is not empty, the first stored data would be output.

A DMAC can directly access the data without the control of a processor. The DMAC combined with FIFO buffer can be used to avoid propagation delay in duplicating data.

The object of the present invention is to provide a duplicator for recording medium, comprising:

a source recording medium;

a source DMAC;

a source FIFO buffer;

a multiplexer;

a plurality of target FIFO buffers;

a plurality of target DMACs; and

a plurality of target recording mediums,

wherein the data of the source recording medium are transmitted to the source FIFO buffer through the source DMAC; the data of the source FIFO buffer are transmitted to a plurality of target FIFO buffers through the multiplexer; and the data of the target FIFO buffer are transmitted to the target recording medium through the target DMAC.

Another object of the present invention is to provide a duplicator for recording medium, comprising:

a data source;

a multiplexer;

a plurality of target FIFO buffers;

a plurality of target DMACs; and

a plurality of target recording mediums,

wherein the data of the data source are transmitted to a plurality of target FIFO buffers through the multiplexer; and the data of the target FIFO buffer are transmitted to the target recording medium through the target DMAC.

Still another object of the present invention is to provide a duplicator for recording medium, comprising:

a source recording medium;

a source DMAC;

a source FIFO buffer;

a multiplexer;

a plurality of comparators;

a plurality of target FIFO buffers;

a plurality of target DMACs; and

a plurality of target recording mediums,

wherein the data of the source recording medium are transmitted to the source FIFO buffer through the source DMAC; the data of the target recording medium are transmitted to the target FIFO buffer through the target DMAC; and the data of the source FIFO buffer are transmitted to the comparators through the multiplexer and compared with the data of the target FIFO buffer by the comparators.

Another object of the present invention is to provide a duplicator for recording medium, comprising:

a data source;

a multiplexer;

a plurality of comparators;

a plurality of target FIFO buffers;

a plurality of target DMACs; and

a plurality of target recording mediums,

wherein the data of the target recording medium are transmitted to the target FIFO buffer through the target DMAC; and the data of the data source are transmitted to the comparators through the multiplexer and compared with the data of the target FIFO buffer by the comparators.

Another object of the present invention is to provide a method for duplicating recording medium, comprising the steps of:

detecting a source recording medium and a plurality of target recording mediums;

configuring a source DMAC for the source recording medium and a plurality of target DMACs for the target recording mediums;

transmitting the data of the source recording medium to a source FIFO buffer through the source DMAC;

transmitting the data of the source FIFO buffer to a plurality of target FIFO buffers through a multiplexer; and

transmitting the data of a plurality of target FIFO buffers to a plurality of target recording mediums through a plurality of target DMACs.

Another object of the present invention is to provide a method for comparing recording medium, comprising the steps of:

detecting a source recording medium and a plurality of target recording mediums;

configuring a source DMAC for the source recording medium and a plurality of target DMACs for the target recording mediums;

transmitting the data of the source recording medium to a source FIFO buffer through the source DMAC;

transmitting the data of a plurality of target recording mediums to a plurality of target FIFO buffers through a plurality of target DMACs;

transmitting the data of the source FIFO buffer to a plurality of

comparators through a multiplexer; and

comparing the data of the source FIFO buffer with the data of the target FIFO buffer by a plurality of comparators.

In the present invention, the recording medium can be selected from a hard disc, an optical disc, a rewritable optical disc, a floppy disc or a memory.

In the present invention, a transferring interface is provided between the source recording medium and the source DMAC.

In the present invention, the transferring interface can be selected from an ATA, serial ATA or SCSI control interface.

The other objects, merits and novel features of the present invention are obvious by the following detailed description together with accompany drawings.

Brief Description of the Drawings

Fig. 1 is a block diagram of the duplicator according to the first embodiment of the present invention.

Fig. 2 is a block diagram of the duplicator according to the second embodiment of the present invention.

Fig. 3 is a flow chart showing the method for duplicating recording medium according to the third embodiment of the present invention.

Fig. 4 is a flow chart showing the method for comparing recording medium according to the third embodiment of the present invention.

Description of the Preferred Embodiment

Now referring to Fig. 1, the duplicator for recording medium according to the first embodiment of the present invention comprises: a source recording medium 13; a source DMAC 12; a source FIFO buffer

11; a multiplexer 14; a plurality of target FIFO buffers 101_1, 101_2,..... and 101_n; a plurality of target DMACs 102_1, 102_2,..... and 102_n; and a plurality of target recording mediums 103_1, 103_2,..... and 103_n. When a source recording medium 13 is detected, a source DMAC 12 is configured. The data of the source recording medium 13 are transmitted to the source FIFO buffer 11 through the source DMAC 12. When the data of the source FIFO buffer 11 are not empty, the data of the source FIFO buffer 11 are transmitted to a plurality of target FIFO buffers (101_1, 101_2,..... and 101_n) through a multiplexer 14. Thereafter, the data of target FIFO buffers (101_1, 101_2,..... and 101_n) are transmitted and duplicated to the target recording medium (103_1, 103_2,..... and 103_n) through the target DMACs (102_1, 102_2,..... and 102_n).

Alternatively, when the data to be duplicated are from an external data source 16, the data of the data source 16 are transmitted to a plurality of target FIFO buffers (101_1, 101_2,..... and 101_n) through the multiplexer 14. Thereafter, the data of target FIFO buffers (101_1, 101_2,..... and 101_n) are transmitted and duplicated to the target recording medium (103_1, 103_2,..... and 103_n) through the target DMACs (102_1, 102_2,..... and 102_n).

A transferring interface can be provided between the source recording medium 13 and the source DMAC 12 for connection. The transferring interface could be an ATA, serial ATA or SCSI control interface, depending on what the source recording medium 13 is.

Now referring to Fig. 2, the duplicator for recording medium according to the second embodiment of the present invention comprises:

a source recording medium 13; a source DMAC 12; a source FIFO buffer 11; a multiplexer 14; a plurality of comparators 105_1, 105_2,..... and 105_n; a plurality of target FIFO buffers 101_1, 101_2,..... and 101_n; a

plurality of target DMACs 102_1, 102_2,..... and 102_n; and a plurality of target recording mediums 103_1, 103_2,..... and 103_n. When a source recording medium 13 is detected, a source DMAC 12 is configured. The data of the source recording medium 13 are transmitted to the source FIFO buffer 11 through the source DMAC 12. When the data of the source FIFO buffer 11 are not empty, the data of the source FIFO buffer 11 are transmitted to a plurality of comparators (105_1, 105_2,..... and 105_n) through a multiplexer 14. The data of the target recording medium (103_1, 103_2,..... and 103_n) are transmitted to the target FIFO buffers (101_1, 101_2,..... and 101_n) through the target DMACs (102_1, 102_2,..... and 102_n). Thereafter, the data of source FIFO 11 are compared with the data of target FIFO buffers (101_1, 101_2,..... and 101_n) by comparators (105_1, 105_2,..... and 105_n), respectively.

Alternatively, when the data to be compared are from an external data source 16, the data of the data source 16 are transmitted to a plurality of comparators (105_1, 105_2,..... and 105_n) through the multiplexer 14. The data of the target recording medium (103_1, 103_2,..... and 103_n) are transmitted to the target FIFO buffers (101_1, 101_2,..... and 101_n) through the target DMACs (102_1, 102_2,..... and 102_n). Thereafter, the data of the data source 16 are compared with the data of target FIFO buffers (101_1, 101_2,..... and 101_n) by comparators (105_1, 105_2,..... and 105_n), respectively.

A transferring interface can be provided between the source recording medium 13 and the source DMAC 12 for connection. The transferring interface could be an ATA, serial ATA or SCSI control interface, depending on what the source recording medium 13 is.

Fig. 3 shows the flow chart of method for duplicating recording medium according to the third embodiment of the present invention.

First, at Step 11, the type of the recording medium is detected. Consequently, at Step 12, DMAC is configured according to the type of the recording medium. Step 13 determines whether the source FIFO is full. If the determining result of Step 13 is No, the process proceeds to Step 14. At Step 14, the data of the source recording medium are transmitted to the source FIFO. If the determining result of Step 13 is Yes, the process proceeds to Step 15. Step 15 determines whether the source FIFO is not empty and all target FIFOs are not full. If the determining result of Step 15 is Yes, the process proceeds to Step 16. At Step 16, the data of source FIFO are transmitted to the target FIFO. If the determining result of Step 15 is No, i.e. the source FIFO is empty or the target FIFO is full, the process proceed to Step 17. Step 17 determines whether the target FIFO is empty. If the determining result of Step 17 is No, the process proceeds to Step 18. At Step 18, the data of target FIFO are transmitted to target recording medium. If the determining result of Step 17 is Yes, the process proceeds to Step 19. Step 19 determines whether all requested data of source recording medium are transmitted to target recording medium. If the determining result of Step 19 is Yes, the process goes to end. If the determining result of Step 19 is No, the process proceeds to Step 13.

Fig. 4 shows the flow chart of method for comparing recording medium according to the third embodiment of the present invention.

First, at Step 21, the type of the recording medium is detected. Consequently, at Step 22, DMAC is configured according to the type of the recording medium. Step 23 determines whether the source FIFO is full. If the determining result of Step 23 is No, the process proceeds to Step 24. At Step 24, the data of the source recording medium are transmitted to the source FIFO. If the determining result of Step 23 is

Yes, the process proceeds to Step 25. Step 25 determines whether the target FIFO is full. If the determining result of Step 25 is No, the process proceeds to Step 26. At Step 26, the data of the target recording medium are transmitted to the target FIFO. If the determining result of Step 25 is Yes, the process proceeds to Step 27. Step 27 determines whether all the source FIFO and the target FIFOs are not empty. If the determining result of Step 27 is Yes, the process proceeds to Step 28. Step 28 compares the data of the source FIFO with the data of the target FIFO by comparators. If the determining result of Step 27 is No, the process proceeds to Step 29. Step 29 determines whether all requested data of source recording medium are compared with all data of target recording medium. If the determining result of Step 29 is Yes, the process goes to end. If the determining result of Step 29 is No, the process proceeds to Step 23.

While several embodiments of the present invention have been described using specific terms, such description is for illustrative purposes only, and it should be understood that changes and variations may be made without departing from the spirit of scope of the following claims.